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Short Communication

# Assessment of Carpal Tunnel Syndrome Symptoms and Functional Status among Medical Students: A Cross-Sectional Survey in Lahore, Pakistan.

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## Abstract

**Background:** Medical students may be at a higher risk for developing CTS due to the repetitive nature of their work and prolonged use of computers. This survey investigated the severity of CTS symptoms and functional status among medical students.

**Methodology:** Among medical students, a quantitative observational cross-sectional survey was carried out in Lahore, Pakistan. A total of 112 students of both gender, aged between 19 to 27 years, participated in this study. A demographic questionnaire and a Boston carpel tunnel syndrome questionnaire were used, and questions related to moderate and strenuous exercise were included in the survey.

**Results:** The functional status of a medical student is categorized as 22.3% in the asymptomatic category, 40.2% in the mild category, 19.6% in the moderate category, and 17.9% fall in the severe category. An association was found between symptom severity and prolonged hand use & functional status. The study results provide insights into the risk factors and potential preventive measures for CTS in this population.

**Conclusion:** The study has collected data on the prevalence of CTS among medical students, the severity of their symptoms, the impact of CTS on their academic performance, and the factors associated with the development and severity of CTS among medical students. Our survey results show that medical students of the study site have not been classified as high-risk.

## Keywords

Carpal Tunnel Syndrome, Boston Carpal Tunnel Syndrome, Symptom Severity Scale, Functional Severity Scale.

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## Introduction

Carpal Tunnel Syndrome (CTS) is a common nerve disorder affecting millions worldwide[1,2]. The condition is caused by the compression or squeezing of the median nerve, leading to pain, numbness, tingling, and weakness in the hand and wrist[3]. Although repetitive hand use is often associated with CTS, non-occupational factors such as obesity, diabetes, and rheumatoid arthritis can also increase the risk of developing the condition[4,5].

Several professional groups have been studied for their prevalence of CTS, including cashiers, laboratory technicians, and dental professionals. For example, a longitudinal study by Meroni et al. found that the annual incidence of CTS among cashiers was 2%, with 40% of cases having comorbidities[6]. Another cross-sectional survey conducted by El-Helaly et al. among laboratory technicians found that 9.7% of them had acquired CTS, with factors such as arm/hand effort, pipetting, repetitive activities, and unadjusted workstations being associated with the condition[7]. Dental professionals, including students and practitioners, are also at risk of CTS due to the repetitive and awkward hand movements required in their work[8].

Medical students, who spend prolonged periods typing and using computers, may also be at risk of developing CTS. A study by Fernandes et al. found that medical students had a higher prevalence of CTS than the general population, with female students being more affected than males[9]. Another study by Zanotta et al. reported a high prevalence of CTS among medical students in Italy, with computer use being a significant risk factor[10].

To better understand the severity of CTS symptoms and functional status among medical students, this study investigates the relationship between CTS and various demographic factors such as age, gender, and hand dominance. This study can help healthcare professionals provide better prevention and treatment strategies for this common nerve disorder by identifying the risk factors associated with CTS among medical students. The findings of this study can also inform the development of ergonomic interventions that may reduce the incidence of CTS among medical students and other populations at risk.

## Methodology

The study used a quantitative, observational, cross-sectional survey design and was conducted among medical students from the UIPT department in Lahore, Pakistan, between September 1, 2021, and March 1, 2022. The study excluded subjects with a medical history of wrist surgery. One hundred twelve students of both genders, aged between 19 to 27 years, participated in the study. Written informed consent was obtained from each participant. The survey consisted of a demographic questionnaire, the Boston Carpal Tunnel Syndrome (CTS) questionnaire, and moderate and strenuous exercise questions.

The Boston Questionnaire is a self-administered assessment tool that evaluates the severity of CTS symptoms and functional status. It comprises two sections with a total of 19 questions. The Symptoms Severity Scale (SSS) contains 11 questions that assess pain severity, weakness, numbness, and tingling sensation. Each question has five possible answers ranging from asymptomatic to severe symptoms. The Functional Status Scale (FSS) contains eight questions that assess the ability to perform functional activities, such as writing, buttoning clothes, and carrying market bags. Each activity has five degrees of difficulty, ranging from no difficulty to the inability to perform the activity due to hand and wrist symptoms. Healthcare professionals commonly use the Boston Questionnaire to assess the severity of CTS symptoms and functional limitations.

The outcome variable was divided into three groups, mild, moderate, and severe, based on the SSS and FSS percentiles. Individuals suspected of having mild CTS symptoms were classified within the $50^{th}$ percentile on the SSS. Those suspected of having moderate CTS symptoms were classified within the $50^{th}$-$75^{th}$ percentile on the SSS. Those suspected of having severe CTS symptoms were classified above the $75^{th}$ percentile on the SSS. The FSS-based susceptibility categories for having

mild-moderate and severe CTS symptoms were determined based on the 75th percentile and the 4th quartile (above the 75th percentile), respectively.

The study data were analyzed using SPSS version 21.0. Descriptive statistics, including mean and standard deviation, were used to summarize quantitative data, while frequencies and percentages were used to present categorical data. The chi-square test was used to compare categorical variables, with a statistically significant p-value less than 0.05.

## Results

The study results provide insight into the characteristics of the study population and the severity of symptoms and functional status among participants. Table 1 displays the descriptive statistics for age, weight, height, and BMI, including mean and standard deviation. The distribution of categories for the SSS and FSS can be found in table 2. The relationship between the symptom severity scale, functional severity scale, and gender is presented in table 3.

**Table 1: Descriptive Statistics of Study Population.**

| **Variables** | | **Mean±SD** |
|---|---|---|
| **Age (years)** | | 22.56±1.43 |
| **Weight (kg)** | | 61.11±11.01 |
| **Height (ft)** | | 5.44±0.25 |
| | | **n(%)** |
| **BMI** | Underweight | 16(14.3) |
| | Normal | 60(53.6) |
| | Overweight | 34(30.4) |
| | Obese | 2(1.8) |

**Table 2: Distribution of symptom severity scale and functional severity scale categories.**

| **Variables** | **FSS n(%)** | **SSS n(%)** |
|---|---|---|
| **Asymptomatic** | 25(22.32) | 20(17.9) |
| **Mild** | 45(40.17) | 52(46.4) |
| **Moderate** | 22(19.64) | 27(24.1) |
| **Severe** | 20(17.85) | 13(11.6) |

**Table 3: Association of symptom severity scale and functional severity scale with gender.**

| **Variables** | | **Gender n(%)** | | **Total n(%)** | **p-value** |
|---|---|---|---|---|---|
| | | **Male** | **Female** | | |
| **SSS** | Asymptomatic | 06(30) | 14(70.0) | 20(17.9) | 0.700 |
| | Mild | 20(38.5) | 32(61.5) | 52(46.4) | |
| | Moderate | 07(26.0) | 20(74.0) | 27(24.1) | |
| | Severe | 04(30.8) | 09(69.2) | 13(11.6) | |
| **FSS** | Asymptomatic | 09(36.0) | 16(64.0) | 25(22.32) | 0.000* |
| | Mild | 15(33.4) | 30(66.6) | 45(40.17) | |
| | Moderate | 10(45.5) | 12(54.5) | 22(19.64) | |
| | Severe | 08(40.0) | 12(60.0) | 20(17.85) | |

## Discussion

This study aimed to evaluate the severity of carpal tunnel syndrome (CTS) symptoms and functional status among medical students in Lahore, Pakistan. The study utilized the Boston Carpal Tunnel Syndrome Questionnaire (BCTQ), which consists of the Symptom Severity Scale and the Functional Status Scale, often used separately. The BCTQ is a reliable and valid diagnostic instrument for CTS. The study found that 67% of participants were male and 33% were female, and most participants with mild symptoms were overweight or obese. The study also identified a significant association between symptom severity and functional status, as well as prolonged hand use, but no significant correlation between CTS and duration of computer usage. The results of this study align with previous research on CTS prevalence and suggest that prolonged hand use is a risk factor for CTS[11]. However, the study had limitations, including a small sample size of participants with a medical history, and did not find a significant association between CTS and medical problems.

In comparison, Kouyoumdjian et al. conducted a larger study with 210 patients with CTS symptoms and 320 control subjects without CTS symptoms or known systemic disorders, focusing on identifying risk factors for CTS and their relationship to nerve conduction abnormality severity[12]. They used a different classification method for the CTS group based on the severity of nerve conduction changes and employed univariate and multivariate analysis to assess CTS risk factors and severity. Their study revealed a significant association between CTS and increased body mass index (BMI) and wrist index and that more severe nerve conduction abnormalities were associated with greater age and wrist index but not with a higher BMI.

Similarly, Zaher et al. conducted a study titled Severity Scoring of Carpal Tunnel Syndrome Symptoms among Medical Students at King Faisal University, Al-Ahsa, Saudi Arabia[13]. Both studies focused on medical students and found that the prevalence of CTS symptoms was higher in female medical students than in males. Both studies also concluded that the BCTQ alone could not be used to diagnose CTS but may be useful for estimating symptom severity. However, there are differences between the two studies, such as the location of the study (Lahore, Pakistan vs. King Faisal University in Al-Ahsa, Saudi Arabia), which may impact the results due to differences in population and environment. Additionally, the first study had a smaller sample size than the second one.

Furthermore, Aljunaid et al. conducted a study titled Carpal Tunnel Syndrome and its Occupational Risk Factors among Dental Students in their Final Year at King Abdulaziz University, Jeddah, Saudi Arabia[10]. This study shares similarities with ours, as both aimed to investigate the prevalence and risk factors of CTS among a specific population. Both studies found a higher prevalence of CTS in females than males and identified an association between body mass index (BMI) and CTS.

In summary, our study found significant associations between symptom severity, functional status, and prolonged hand use but no significant correlation with the duration of computer usage. The study had limitations, such as a small sample size and lack of significant association with medical problems. Findings from other studies conducted by Aljunaid et al.[10], Kouyoumdjian et al.[12], and Zaher et al.[13], support our findings on the prevalence of CTS and its risk factors. Still, there are differences in sample size, locations, and additional findings.

## Conclusion

In conclusion, this study sheds light on the impact of carpal tunnel syndrome (CTS) on the academic performance of medical students, which could inform interventions aimed at mitigating the negative effects of CTS on academic performance. It's important to note that as a cross-sectional study, the findings only provide a snapshot of the population at a specific point in time and cannot establish causality. Therefore, the results should be interpreted with caution and validated by further research.

The findings of this study suggest that, overall, medical students may not be considered a high-

risk group for developing CTS. However, when analyzing the data by gender, it was observed that female medical students had a higher risk of developing CTS than male medical students. This indicates that further research is warranted to better understand the factors contributing to the increased risk of CTS in female medical students. Additionally, the study may suffer from selection bias.

## Conflicts of Interest

The authors have declared that no competing interests exist.

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